ATTACHMENT 7

ECONOMIC ANALYSIS – WATER SUPPLY COSTS AND BENEFITS

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JOSHUA BASIN WATER DISTRICT RECHARGE BASIN AND PIPELINE PROJECT

The Joshua Basin Water District Recharge Basin and Pipeline Project will provide a means to move supplemental water supplies imported from the State Water Project to recharge the region's groundwater aquifers, and subsequently re-pumped by local water purveyors to serve municipal and commercial demands. A study by the U.S. Geological Survey[1] found that the basin's natural replenishment rate may be near zero, and the Joshua Tree groundwater basin has been overdraft for several decades.

Based on the anticipated 2,000 acre-foot per year use of the water recharge basins, annual operation and maintenance is expected to average $75,000 per year. This includes pond scarification, site inspection and general maintenance, weed abatement, equipment maintenance, power and miscellaneous materials. Other operation costs include purchase of State Water Project water at $250 per acre-foot.

Water is imported from the State Water Project California Aqueduct near Hesperia, and transported to the border of the Joshua Basin Water District via the existing Morongo Valley Pipeline. The current fee the State Water Project charges for import water is $250 per acre-foot.

The time stream of capital and O&M costs are presented in Table 1.

There are six identified benefits associated with the JBWD Recharge Pond and Pipeline project:

- Water supply enhancement. Importing an average of 2,000 acre-feet per year reduces existing conditions of overdraft and begins to refill the basin to pre-development levels. This benefit is not monetized, but is expected to be substantial. The alternative of long-term overdraft is not a viable solution for the community.

- Pump lift. Water users pump groundwater to serve their customers. Every foot of water table rise will avoid an energy payment of approximately $0.22 per acre-foot pumped per year. This benefit is included in TABLEYY.

  According to the USGS[1], current pumping in the 12-square mile Joshua Tree subbasin is approximately 1,610 acre-feet per year and overdraft is 403 acre-feet per year. Septic return flows are estimated to be 73 percent of extractions and observed water table declines have averaged 1.5 to 2 feet per year. It appears that only a small fraction of the water returned to septic systems has made its way to the water table. Current overdraft is estimated to average

[1] USGS, 2004. Evaluation of Geohydraulic Framework, Recharge Estimates, and Ground-Water Flow in the Joshua Tree Area, San Bernardino County, California. USGS Scientific Investigations Report 2004-5267

Table 1 - Application "Table 11", Annual Cost of Project, JBWD Recharge Ponds

Table 11- Annual Cost of Project
(All costs should be in 2009 Dollars)
Project Title: Joshua Basin Water District Recharge Basin and Pipeline Project (CR)

	Initial Costs	Operations and Maintenance Costs [1]						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2008	$285,652						$285,652	1.010	$288,509
2009	$992,992						$992,992	1.000	$992,992
2010	$1,050,868						$1,050,868	0.943	$991,385
2011	$4,524,542						$4,524,542	0.890	$4,026,826
2012	$1,173,946	$5,000	$42,000	$28,000		$333,333	$1,582,279	0.840	$1,328,512
2013		$5,000	$42,000	$28,000		$500,000	$575,000	0.792	$455,454
2014		$5,000	$42,000	$28,000		$500,000	$575,000	0.747	$429,673
2015		$5,000	$42,000	$28,000		$500,000	$575,000	0.705	$405,352
2016		$5,000	$42,000	$28,000		$500,000	$575,000	0.665	$382,408
2017		$5,000	$42,000	$28,000		$500,000	$575,000	0.627	$360,762
2018		$5,000	$42,000	$28,000		$500,000	$575,000	0.592	$340,342
2019		$5,000	$42,000	$28,000		$500,000	$575,000	0.558	$321,077
2020		$5,000	$42,000	$28,000		$500,000	$575,000	0.527	$302,903
2021		$5,000	$42,000	$28,000		$500,000	$575,000	0.497	$285,757
2022		$5,000	$42,000	$28,000		$500,000	$575,000	0.469	$269,582
2023		$5,000	$42,000	$28,000		$500,000	$575,000	0.442	$254,323
2024		$5,000	$42,000	$28,000		$500,000	$575,000	0.417	$239,927
2025		$5,000	$42,000	$28,000		$500,000	$575,000	0.394	$226,347
2026		$5,000	$42,000	$28,000		$500,000	$575,000	0.371	$213,535
2027		$5,000	$42,000	$28,000		$500,000	$575,000	0.350	$201,448
2028		$5,000	$42,000	$28,000		$500,000	$575,000	0.331	$190,045
2029		$5,000	$42,000	$28,000		$500,000	$575,000	0.312	$179,288
2030		$5,000	$42,000	$28,000		$500,000	$575,000	0.294	$169,139
2031		$5,000	$42,000	$28,000		$500,000	$575,000	0.278	$159,565
2032		$5,000	$42,000	$28,000		$500,000	$575,000	0.262	$150,533
2033		$5,000	$42,000	$28,000		$500,000	$575,000	0.247	$142,013
2034		$5,000	$42,000	$28,000		$500,000	$575,000	0.233	$133,974
2035		$5,000	$42,000	$28,000		$500,000	$575,000	0.220	$126,391
2036		$5,000	$42,000	$28,000		$500,000	$575,000	0.207	$119,237
2037		$5,000	$42,000	$28,000		$500,000	$575,000	0.196	$112,487
2038		$5,000	$42,000	$28,000		$500,000	$575,000	0.185	$106,120
2039		$5,000	$42,000	$28,000		$500,000	$575,000	0.174	$100,113
2040		$5,000	$42,000	$28,000		$500,000	$575,000	0.164	$94,447
2041		$5,000	$42,000	$28,000		$500,000	$575,000	0.155	$89,101
2042		$5,000	$42,000	$28,000		$500,000	$575,000	0.146	$84,057
2043		$5,000	$42,000	$28,000		$500,000	$575,000	0.138	$79,299
2044		$5,000	$42,000	$28,000		$500,000	$575,000	0.130	$74,811
2045		$5,000	$42,000	$28,000		$500,000	$575,000	0.123	$70,576
2046		$5,000	$42,000	$28,000		$500,000	$575,000	0.116	$66,581
2047		$5,000	$42,000	$28,000		$500,000	$575,000	0.109	$62,812
2048		$5,000	$42,000	$28,000		$500,000	$575,000	0.103	$59,257
2049		$5,000	$42,000	$28,000		$500,000	$575,000	0.097	$55,903
2050		$5,000	$42,000	$28,000		$500,000	$575,000	0.092	$52,738
2051		$5,000	$42,000	$28,000		$500,000	$575,000	0.087	$49,753
2052		$5,000	$42,000	$28,000		$500,000	$575,000	0.082	$46,937
2053		$5,000	$42,000	$28,000		$500,000	$575,000	0.077	$44,280
2054		$5,000	$42,000	$28,000		$500,000	$575,000	0.073	$41,774
2055		$5,000	$42,000	$28,000		$500,000	$575,000	0.069	$39,409
2056		$5,000	$42,000	$28,000		$500,000	$575,000	0.065	$37,179
2057		$5,000	$42,000	$28,000		$500,000	$575,000	0.061	$35,074
2058		$5,000	$42,000	$28,000		$500,000	$575,000	0.058	$33,089
2059		$5,000	$42,000	$28,000		$500,000	$575,000	0.054	$31,216
2060		$5,000	$42,000	$28,000		$500,000	$575,000	0.051	$29,449
2061		$5,000	$42,000	$28,000		$500,000	$575,000	0.048	$27,782
2062		$5,000	$42,000	$28,000		$500,000	$575,000	0.046	$26,209
2063		$5,000	$42,000	$28,000		$500,000	$575,000	0.043	$24,726
2064		$5,000	$42,000	$28,000		$500,000	$575,000	0.041	$23,326
2065		$5,000	$42,000	$28,000		$500,000	$575,000	0.038	$22,006
2066		$5,000	$42,000	$28,000		$500,000	$575,000	0.036	$20,760
2067		$5,000	$42,000	$28,000		$500,000	$575,000	0.034	$19,585
2068		$5,000	$42,000	$28,000		$500,000	$575,000	0.032	$18,477
2069		$5,000	$42,000	$28,000		$500,000	$575,000	0.030	$17,431
2070		$5,000	$42,000	$28,000		$500,000	$575,000	0.029	$16,444
2071		$5,000	$42,000	$28,000		$500,000	$575,000	0.027	$15,513
2072		$5,000	$42,000	$28,000		$500,000	$575,000	0.025	$14,635
2073		$5,000	$42,000	$28,000		$500,000	$575,000	0.024	$13,807
2074		$5,000	$42,000	$28,000		$500,000	$575,000	0.023	$13,025
2075		$5,000	$42,000	$28,000		$500,000	$575,000	0.021	$12,288
2076		$5,000	$42,000	$28,000		$500,000	$575,000	0.020	$11,592
2077		$5,000	$42,000	$28,000		$500,000	$575,000	0.019	$10,936
2078		$5,000	$42,000	$28,000		$500,000	$575,000	0.018	$10,317
2079		$5,000	$42,000	$28,000		$500,000	$575,000	0.017	$9,733
2080		$5,000	$42,000	$28,000		$500,000	$575,000	0.016	$9,182
2081		$5,000	$42,000	$28,000		$500,000	$575,000	0.015	$8,663
2082		$5,000	$42,000	$28,000		$500,000	$575,000	0.014	$8,172
2083		$5,000	$42,000	$28,000		$500,000	$575,000	0.013	$7,710
2084		$5,000	$42,000	$28,000		$500,000	$575,000	0.013	$7,273
2085		$5,000	$42,000	$28,000		$500,000	$575,000	0.012	$6,862
2086		$5,000	$42,000	$28,000		$500,000	$575,000	0.011	$6,473
Total	$8,028,000							...	
								Total Present Value of Discounted Costs (Sum of Column (i))	$15,566,689
								Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries	

Comments: Other (column f) costs include purchase of SWP water at $250/af; System is grailty-driven -- no pumping is required

between 270 and 430 acre-feet per year depending on the estimation of net natural recharge, which ranges from zero to 157 acre-feet per year. Using an average specific yield derived from the USGS study of 3.5 percent, a recharge of 2,000 acre-feet per year would raise water tables about 7.4 feet per year, or 370 feet over what they would have been after operating for the 75-year project life.

Water extractions are expected to grow from 1,610 to about 2,090 over the next 25 years. Assuming this increase is continued, extractions would be about 3,030 at the end of the project life. Assuming pump efficiency of 70 percent and a 2009 energy cost of $0.15 per kWh, the benefit detailed in Table 2 is $0.22 per acre-foot per foot of lift per year.

- Water Quality. Importing SWP water into the basin maintains lower nitrate concentrations, and will defer the need for wastewater treatment for a period of years. This deferral would have significant economic benefits, but has not been monetized or estimated.

- Reliability. Eliminating overdraft and replenishing the groundwater system provides stored water for use during prolonged droughts or outages in the State Water Project supply system. This benefit is not monetized, but is expected to be substantial. The alternative of no storage reserve during drought periods would put additional pressure on the SWP supply during drought period and is not considered a viable solution for the community.

- Monitoring and Modeling. A cooperative study with the U.S. Geological Survey was performed as part of this project. Tangible benefits from

Table 2 - Time Series of Pumping Lift Benefits

Year	Aggegate reduced pumping lift, ft	Pumping af/yr	Lift benefit (af-ft)	Lift benefit at e=70%, $0.15/kWh
2012	7	1,610	11,979	$ 2,618
2013	15	1,629	24,244	$ 5,299
2014	22	1,648	36,795	$ 8,042
2015	30	1,668	49,631	$ 10,848
2016	37	1,687	62,753	$ 13,716
2017	45	1,706	76,161	$ 16,647
2018	52	1,725	89,854	$ 19,640
2019	60	1,744	103,833	$ 22,695
2020	67	1,764	118,098	$ 25,813
2021	74	1,783	132,649	$ 28,993
2022	82	1,802	147,485	$ 32,236
2023	89	1,821	162,607	$ 35,541
2024	97	1,840	178,015	$ 38,909
2025	104	1,860	193,708	$ 42,339
2026	112	1,879	209,688	$ 45,832
2027	119	1,898	225,952	$ 49,387
2028	126	1,917	242,503	$ 53,004
2029	134	1,936	259,339	$ 56,684
2030	141	1,956	276,461	$ 60,427
2031	149	1,975	293,869	$ 64,231
2032	156	1,994	311,563	$ 68,099
2033	164	2,013	329,542	$ 72,028
2034	171	2,032	347,807	$ 76,021
2035	179	2,052	366,357	$ 80,075
2036	186	2,071	385,193	$ 84,192
2037	193	2,090	404,315	$ 88,372
2038	201	2,109	423,723	$ 92,614
2039	208	2,128	443,417	$ 96,918
2040	216	2,148	463,396	$ 101,285
2041	223	2,167	483,661	$ 105,714
2042	231	2,186	504,211	$ 110,206
2043	238	2,205	525,048	$ 114,760
2044	246	2,224	546,170	$ 119,377
2045	253	2,244	567,577	$ 124,056
2046	260	2,263	589,271	$ 128,798
2047	268	2,282	611,250	$ 133,602
2048	275	2,301	633,515	$ 138,468
2049	283	2,320	656,065	$ 143,397
2050	290	2,340	678,902	$ 148,389
2051	298	2,359	702,024	$ 153,442
2052	305	2,378	725,432	$ 158,559
2053	313	2,397	749,125	$ 163,737
2054	320	2,416	773,104	$ 168,978
2055	327	2,436	797,369	$ 174,282
2056	335	2,455	821,920	$ 179,648
2057	342	2,474	846,756	$ 185,077
2058	350	2,493	871,878	$ 190,568
2059	357	2,512	897,286	$ 196,121
2060	365	2,532	922,979	$ 201,737
2061	372	2,551	948,958	$ 207,415
2062	379	2,570	975,223	$ 213,156
2063	387	2,589	1,001,774	$ 218,959
2064	394	2,608	1,028,610	$ 224,825
2065	402	2,628	1,055,732	$ 230,753
2066	409	2,647	1,083,140	$ 236,743
2067	417	2,666	1,110,833	$ 242,796
2068	424	2,685	1,138,813	$ 248,912
2069	432	2,704	1,167,077	$ 255,090
2070	439	2,724	1,195,628	$ 261,330
2071	446	2,743	1,224,464	$ 267,633
2072	454	2,762	1,253,586	$ 273,998
2073	461	2,781	1,282,994	$ 280,426
2074	469	2,800	1,312,688	$ 286,916
2075	476	2,820	1,342,667	$ 293,469
2076	484	2,839	1,372,932	$ 300,084
2077	491	2,858	1,403,482	$ 306,761
2078	499	2,877	1,434,318	$ 313,501
2079	506	2,896	1,465,440	$ 320,303
2080	513	2,916	1,496,848	$ 327,168
2081	521	2,935	1,528,542	$ 334,096
2082	528	2,954	1,560,521	$ 341,085
2083	536	2,973	1,592,786	$ 348,137
2084	543	2,992	1,625,336	$ 355,252
2085	551	3,012	1,658,173	$ 362,429
2086	558	3,031	1,691,295	$ 369,669

these studies are a groundwater flow model that describes the movement of groundwater in the Joshua Tree basin, and the installation of a multi-completion monitoring well on the recharge pond site that will be used to verify the timing of recharged water to the target production aquifers. These benefits have not been monetized, but are important to the region's understating of water recharge and movement.

- Avoided Water Treatment Plant Cost. The Joshua Basin Water District service area has little natural recharge. Average rainfall within the Joshua Tree area is roughly five inches per year[2]. Inflows as much as 157 acre-feet per year via runoff from local washes has been estimated by USGS modelers[3,] but there is great uncertainty how much of this water reaches the water table. USGS age-dating of the water suggest the water being pumped today was recharged between 5,000 and 30,000 years ago – water is being mined and not readily replenished.

  The major aquifer units are in a state of overdraft. Overdraft is currently estimated to be up to 430 acre-feet per year, and is projected to increase to up to 660 acre-feet per year by 2030 without action to import supplemental supply and build recharge projects.

  The Mojave Water Agency began delivering imported State Water Project Water through the 71-mile Morongo Pipeline in 1995. This facility was a joint effort of Joshua Basin Water District, Hi-Desert Water District, the Bighorn-Desert View Water Agency and San Bernardino County Service Area 70. To date, JBWD has not utilized any water from this source.

  The pipeline will deliver water to percolation ponds that act as natural filtration systems as the water seeps back into the ground to recharge the aquifer. If no project is constructed, the aquifers would continue to be overdrafted and the long-term viability of the community threatened. An alternative to groundwater percolation ponds would be the construction of a surface water treatment plant.

  If the recharge project proposed for grant funding is not constructed, a local water treatment plant would be constructed instead. Since the regional water treatment plant would be dependent on the variability of State Water Project supplies, there would need to be significant redundancy in the surface water and groundwater production capabilities to avoid severe rationing in the event of a drought or supply outage. Based on expected SWP reliability reported in MWA's 2005 Urban Water Management Plan4, it is assumed that the treatment plant would be sized to utilize projected SWP supplies under droughts similar to 1987-1992, and the wellfield would be sized to meet all needs during drought conditions. Treatment plant costs reported in Table 3 are derived from Chapter 9 of the RWMP and updated using recent costs

[2] RWMP p.3-23

[3] USGS, 2004

[4] MWA, November 2005, "2004 Regional Water Management Plan, Supplement A: 2005 Urban Water Management Plan", Tables 5-16(s) and 5-17(s)

from a comparably sized plant designed for the City of Lodi[5]. The water treatment plant is assumed to have a 40 year useful life before major replacements are required.

A conveyance pipeline similar to the one proposed to serve the recharge ponds would still be required. The cost of the recharge pond pipeline is assumed as the cost of the water treatment plant pipeline in Table 3.

Water supply benefits of the Joshua Basin Water District Recharge Basin and Pipeline Project are summarized in Table 4 and **Error! Reference source not found.**.

Table 3 - Water Treatment Plant Alternative Costs

	Capacity (af/yr)	Averge Yield (af/yr)	Capital Cost (2009$)	O&M Cost (2009$)
Surface Water Treatment Plant	4,000	2,000	$11,400,000	$501,000
Conveyance Pipeline	4,000	2,000	$4,742,000	$20,000
Total	4,000	2,000	$16,142,000	$521,000

[5] A 2010 estimate for the 10 mgd Lodi plant is $32 million including contingencies, and excluding land, wastewater connection fees, and distributin mains. http://ca-nv-awwa.org/iMISpublic/Fall2010/3/1400_Session_3_Stratton.pdf The plant will treat a similar quality water. The environmental documentation has been complted. http://www.lodi.gov/community_development/pdf/EIR%20pdfs/Surface_Water_Treatment_Draft_IS_MND051110.pdf

Table 4 - Application "Table 12" Annual Water Supply Benefits, JBWD Recharge Ponds

Table 12 - Annual Water Supply Benefits (All benefits should be in 2009 dollars) Project Title: Joshua Basin Water District Recharge Basin and Pipeline Project (CR)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009	Pumping Lift	1 af at 1 ft lift			0		$0	1.000	$0
2010	Pumping Lift	1 af at 1 ft lift			0		$0	0.943	$0
2011	Pumping Lift	1 af at 1 ft lift			0		$0	0.890	$0
2012	Pumping Lift	1 af at 1 ft lift	807,608	795,630	(11,978)	-$0.219	$2,626	0.840	$2,205
2013	Pumping Lift	1 af at 1 ft lift	819,879	795,636	(24,242)	-$0.219	$5,314	0.792	$4,209
2014	Pumping Lift	1 af at 1 ft lift	832,211	795,419	(36,792)	-$0.219	$8,065	0.747	$6,027
2015	Pumping Lift	1 af at 1 ft lift	844,606	794,978	(49,628)	-$0.219	$10,878	0.705	$7,669
2016	Pumping Lift	1 af at 1 ft lift	857,063	794,314	(62,749)	-$0.219	$13,755	0.665	$9,148
2017	Pumping Lift	1 af at 1 ft lift	869,582	793,426	(76,156)	-$0.219	$16,693	0.627	$10,474
2018	Pumping Lift	1 af at 1 ft lift	882,164	792,315	(89,848)	-$0.219	$19,695	0.592	$11,657
2019	Pumping Lift	1 af at 1 ft lift	894,807	790,981	(103,827)	-$0.219	$22,759	0.558	$12,708
2020	Pumping Lift	1 af at 1 ft lift	907,513	789,423	(118,091)	-$0.219	$25,885	0.527	$13,636
2021	Pumping Lift	1 af at 1 ft lift	920,281	787,641	(132,640)	-$0.219	$29,075	0.497	$14,449
2022	Pumping Lift	1 af at 1 ft lift	933,112	785,636	(147,476)	-$0.219	$32,327	0.469	$15,156
2023	Pumping Lift	1 af at 1 ft lift	946,004	783,407	(162,597)	-$0.219	$35,641	0.442	$15,764
2024	Pumping Lift	1 af at 1 ft lift	958,959	780,955	(178,003)	-$0.219	$39,018	0.417	$16,281
2025	Pumping Lift	1 af at 1 ft lift	971,976	778,280	(193,696)	-$0.219	$42,458	0.394	$16,713
2026	Pumping Lift	1 af at 1 ft lift	985,055	775,381	(209,674)	-$0.219	$45,961	0.371	$17,068
2027	Pumping Lift	1 af at 1 ft lift	998,196	772,258	(225,938)	-$0.219	$49,526	0.350	$17,351
2028	Pumping Lift	1 af at 1 ft lift	1,011,400	768,912	(242,487)	-$0.219	$53,153	0.331	$17,568
2029	Pumping Lift	1 af at 1 ft lift	1,024,665	765,343	(259,323)	-$0.219	$56,844	0.312	$17,724
2030	Pumping Lift	1 af at 1 ft lift	1,037,993	761,550	(276,444)	-$0.219	$60,596	0.294	$17,825
2031	Pumping Lift	1 af at 1 ft lift	1,051,384	757,533	(293,850)	-$0.219	$64,412	0.278	$17,875
2032	Pumping Lift	1 af at 1 ft lift	1,064,836	753,293	(311,543)	-$0.219	$68,290	0.262	$17,878
2033	Pumping Lift	1 af at 1 ft lift	1,078,350	748,830	(329,521)	-$0.219	$72,231	0.247	$17,839
2034	Pumping Lift	1 af at 1 ft lift	1,091,927	744,143	(347,784)	-$0.219	$76,234	0.233	$17,762
2035	Pumping Lift	1 af at 1 ft lift	1,105,566	739,233	(366,334)	-$0.219	$80,300	0.220	$17,651
2036	Pumping Lift	1 af at 1 ft lift	1,119,267	734,099	(385,169)	-$0.219	$84,429	0.207	$17,508
2037	Pumping Lift	1 af at 1 ft lift	1,133,031	728,741	(404,290)	-$0.219	$88,620	0.196	$17,337
2038	Pumping Lift	1 af at 1 ft lift	1,146,856	723,160	(423,696)	-$0.219	$92,874	0.185	$17,141
2039	Pumping Lift	1 af at 1 ft lift	1,160,744	717,356	(443,388)	-$0.219	$97,191	0.174	$16,922
2040	Pumping Lift	1 af at 1 ft lift	1,174,694	711,328	(463,366)	-$0.219	$101,570	0.164	$16,683
2041	Pumping Lift	1 af at 1 ft lift	1,188,706	705,077	(483,630)	-$0.219	$106,012	0.155	$16,427
2042	Pumping Lift	1 af at 1 ft lift	1,202,781	698,602	(504,179)	-$0.219	$110,516	0.146	$16,156
2043	Pumping Lift	1 af at 1 ft lift	1,216,918	691,904	(525,014)	-$0.219	$115,083	0.138	$15,871
2044	Pumping Lift	1 af at 1 ft lift	1,231,116	684,982	(546,135)	-$0.219	$119,713	0.130	$15,575
2045	Pumping Lift	1 af at 1 ft lift	1,245,377	677,836	(567,541)	-$0.219	$124,405	0.123	$15,270
2046	Pumping Lift	1 af at 1 ft lift	1,259,701	670,468	(589,233)	-$0.219	$129,160	0.116	$14,956
2047	Pumping Lift	1 af at 1 ft lift	1,274,086	662,875	(611,211)	-$0.219	$133,977	0.109	$14,636
2048	Pumping Lift	1 af at 1 ft lift	1,288,534	655,060	(633,474)	-$0.219	$138,858	0.103	$14,310
2049	Pumping Lift	1 af at 1 ft lift	1,303,044	647,020	(656,023)	-$0.219	$143,800	0.097	$13,981
2050	Pumping Lift	1 af at 1 ft lift	1,317,616	638,758	(678,858)	-$0.219	$148,806	0.092	$13,648

Table 12 - Annual Water Supply Benefits (All benefits should be in 2009 dollars) Project Title: Joshua Basin Water District Recharge Basin and Pipeline Project (CR)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2051	Pumping Lift	1 af at 1 ft lift	1,332,250	630,271	(701,979)	-$0.219	$153,874	0.087	$13,314
2052	Pumping Lift	1 af at 1 ft lift	1,346,947	621,562	(725,385)	-$0.219	$159,004	0.082	$12,979
2053	Pumping Lift	1 af at 1 ft lift	1,361,705	612,628	(749,077)	-$0.219	$164,198	0.077	$12,645
2054	Pumping Lift	1 af at 1 ft lift	1,376,526	603,472	(773,055)	-$0.219	$169,454	0.073	$12,311
2055	Pumping Lift	1 af at 1 ft lift	1,391,410	594,092	(797,318)	-$0.219	$174,772	0.069	$11,978
2056	Pumping Lift	1 af at 1 ft lift	1,406,355	584,488	(821,867)	-$0.219	$180,153	0.065	$11,648
2057	Pumping Lift	1 af at 1 ft lift	1,421,362	574,661	(846,702)	-$0.219	$185,597	0.061	$11,321
2058	Pumping Lift	1 af at 1 ft lift	1,436,432	564,610	(871,822)	-$0.219	$191,103	0.058	$10,997
2059	Pumping Lift	1 af at 1 ft lift	1,451,564	554,336	(897,228)	-$0.219	$196,672	0.054	$10,677
2060	Pumping Lift	1 af at 1 ft lift	1,466,758	543,838	(922,920)	-$0.219	$202,304	0.051	$10,361
2061	Pumping Lift	1 af at 1 ft lift	1,482,015	533,117	(948,898)	-$0.219	$207,998	0.048	$10,050
2062	Pumping Lift	1 af at 1 ft lift	1,497,333	522,173	(975,161)	-$0.219	$213,755	0.046	$9,743
2063	Pumping Lift	1 af at 1 ft lift	1,512,714	511,005	(1,001,710)	-$0.219	$219,575	0.043	$9,442
2064	Pumping Lift	1 af at 1 ft lift	1,528,157	499,613	(1,028,544)	-$0.219	$225,457	0.041	$9,146
2065	Pumping Lift	1 af at 1 ft lift	1,543,662	487,998	(1,055,665)	-$0.219	$231,402	0.038	$8,856
2066	Pumping Lift	1 af at 1 ft lift	1,559,230	476,159	(1,083,071)	-$0.219	$237,409	0.036	$8,572
2067	Pumping Lift	1 af at 1 ft lift	1,574,860	464,097	(1,110,762)	-$0.219	$243,479	0.034	$8,293
2068	Pumping Lift	1 af at 1 ft lift	1,590,551	451,812	(1,138,740)	-$0.219	$249,612	0.032	$8,021
2069	Pumping Lift	1 af at 1 ft lift	1,606,305	439,303	(1,167,003)	-$0.219	$255,807	0.030	$7,755
2070	Pumping Lift	1 af at 1 ft lift	1,622,122	426,570	(1,195,551)	-$0.219	$262,065	0.029	$7,495
2071	Pumping Lift	1 af at 1 ft lift	1,638,000	413,614	(1,224,386)	-$0.219	$268,385	0.027	$7,241
2072	Pumping Lift	1 af at 1 ft lift	1,653,941	400,435	(1,253,506)	-$0.219	$274,769	0.025	$6,994
2073	Pumping Lift	1 af at 1 ft lift	1,669,944	387,032	(1,282,912)	-$0.219	$281,214	0.024	$6,752
2074	Pumping Lift	1 af at 1 ft lift	1,686,009	373,405	(1,312,603)	-$0.219	$287,723	0.023	$6,518
2075	Pumping Lift	1 af at 1 ft lift	1,702,136	359,555	(1,342,581)	-$0.219	$294,294	0.021	$6,289
2076	Pumping Lift	1 af at 1 ft lift	1,718,326	345,482	(1,372,844)	-$0.219	$300,927	0.020	$6,067
2077	Pumping Lift	1 af at 1 ft lift	1,734,577	331,185	(1,403,392)	-$0.219	$307,624	0.019	$5,851
2078	Pumping Lift	1 af at 1 ft lift	1,750,891	316,665	(1,434,227)	-$0.219	$314,382	0.018	$5,641
2079	Pumping Lift	1 af at 1 ft lift	1,767,267	301,921	(1,465,347)	-$0.219	$321,204	0.017	$5,437
2080	Pumping Lift	1 af at 1 ft lift	1,783,706	286,953	(1,496,752)	-$0.219	$328,088	0.016	$5,239
2081	Pumping Lift	1 af at 1 ft lift	1,800,206	271,762	(1,528,444)	-$0.219	$335,035	0.015	$5,047
2082	Pumping Lift	1 af at 1 ft lift	1,816,769	256,348	(1,560,421)	-$0.219	$342,044	0.014	$4,861
2083	Pumping Lift	1 af at 1 ft lift	1,833,394	240,710	(1,592,684)	-$0.219	$349,116	0.013	$4,681
2084	Pumping Lift	1 af at 1 ft lift	1,850,081	224,849	(1,625,232)	-$0.219	$356,251	0.013	$4,506
2085	Pumping Lift	1 af at 1 ft lift	1,866,831	208,764	(1,658,066)	-$0.219	$363,448	0.012	$4,337
2086	Pumping Lift	1 af at 1 ft lift	1,883,642	192,456	(1,691,186)	-$0.219	$370,708	0.011	$4,173
Project Life								…	
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		$864,298
Comments:									

Table 5 - Application "Table 13" Avoided Costs, JBWD Recharge Ponds

Table 13 - Annual Costs of Avoided Projects (All avoided costs should be in 2009 dollars) Project Title: Joshua Basin Water District Recharge Basin and Pipeline Project (CR)						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): Joshua Basin Water District Surface Water Treatment Plant *Avoided Project Description: Pipeline conveyance and new surface water treatment plant*				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2009				$0	1.000	$0
2010				$0	0.943	$0
2011	$16,142,000		$521,000	$16,663,000	0.890	$14,830,011
2012			$521,000	$521,000	0.840	$437,442
2013			$521,000	$521,000	0.792	$412,681
2014			$521,000	$521,000	0.747	$389,322
2015			$521,000	$521,000	0.705	$367,284
2016			$521,000	$521,000	0.665	$346,495
2017			$521,000	$521,000	0.627	$326,882
2018			$521,000	$521,000	0.592	$308,379
2019			$521,000	$521,000	0.558	$290,924
2020			$521,000	$521,000	0.527	$274,456
2021			$521,000	$521,000	0.497	$258,921
2022			$521,000	$521,000	0.469	$244,265
2023			$521,000	$521,000	0.442	$230,439
2024			$521,000	$521,000	0.417	$217,395
2025			$521,000	$521,000	0.394	$205,090
2026			$521,000	$521,000	0.371	$193,481
2027			$521,000	$521,000	0.350	$182,529
2028			$521,000	$521,000	0.331	$172,197
2029			$521,000	$521,000	0.312	$162,450
2030			$521,000	$521,000	0.294	$153,255
2031			$521,000	$521,000	0.278	$144,580
2032			$521,000	$521,000	0.262	$136,396
2033			$521,000	$521,000	0.247	$128,676
2034			$521,000	$521,000	0.233	$121,392
2035			$521,000	$521,000	0.220	$114,521
2036			$521,000	$521,000	0.207	$108,039
2037			$521,000	$521,000	0.196	$101,923
2038			$521,000	$521,000	0.185	$96,154
2039			$521,000	$521,000	0.174	$90,711
2040			$521,000	$521,000	0.164	$85,577
2041			$521,000	$521,000	0.155	$80,733
2042			$521,000	$521,000	0.146	$76,163
2043			$521,000	$521,000	0.138	$71,852
2044			$521,000	$521,000	0.130	$67,785
2045			$521,000	$521,000	0.123	$63,948
2046			$521,000	$521,000	0.116	$60,328
2047			$521,000	$521,000	0.109	$56,913
2048			$521,000	$521,000	0.103	$53,692
2049			$521,000	$521,000	0.097	$50,653
2050			$521,000	$521,000	0.092	$47,786

Table 13 - Annual Costs of Avoided Projects **(All avoided costs should be in 2009 dollars)** **Project Title: Joshua Basin Water District Recharge Basin and Pipeline Project (CR)**						
	Costs				**Discounting Calculations**	
(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**
YEAR	Alternative (Avoided Project Name): Joshua Basin Water District Surface Water Treatment Plant *Avoided Project Description: Pipeline conveyance and new surface water treatment plant*				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2051		$16,142,000	$521,000	$16,663,000	0.087	$1,441,806
2052			$521,000	$521,000	0.082	$42,529
2053			$521,000	$521,000	0.077	$40,122
2054			$521,000	$521,000	0.073	$37,851
2055			$521,000	$521,000	0.069	$35,708
2056			$521,000	$521,000	0.065	$33,687
2057			$521,000	$521,000	0.061	$31,780
2058			$521,000	$521,000	0.058	$29,981
2059			$521,000	$521,000	0.054	$28,284
2060			$521,000	$521,000	0.051	$26,683
2061			$521,000	$521,000	0.048	$25,173
2062			$521,000	$521,000	0.046	$23,748
2063			$521,000	$521,000	0.043	$22,404
2064			$521,000	$521,000	0.041	$21,136
2065			$521,000	$521,000	0.038	$19,939
2066			$521,000	$521,000	0.036	$18,811
2067			$521,000	$521,000	0.034	$17,746
2068			$521,000	$521,000	0.032	$16,741
2069			$521,000	$521,000	0.030	$15,794
2070			$521,000	$521,000	0.029	$14,900
2071			$521,000	$521,000	0.027	$14,056
2072			$521,000	$521,000	0.025	$13,261
2073			$521,000	$521,000	0.024	$12,510
2074			$521,000	$521,000	0.023	$11,802
2075			$521,000	$521,000	0.021	$11,134
2076			$521,000	$521,000	0.020	$10,504
2077			$521,000	$521,000	0.019	$9,909
2078			$521,000	$521,000	0.018	$9,348
2079			$521,000	$521,000	0.017	$8,819
2080			$521,000	$521,000	0.016	$8,320
2081			$521,000	$521,000	0.015	$7,849
2082			$521,000	$521,000	0.014	$7,405
2083			$521,000	$521,000	0.013	$6,986
2084			$521,000	$521,000	0.013	$6,590
2085			$521,000	$521,000	0.012	$6,217
2086			$521,000	$521,000	0.011	$5,865
...					...	
Project Life				0	...	
					Total Present Value of Discounted Costs (Sum of Column (g))	$23,857,118
					(%) Avoided Cost Claimed by Project	100%
					Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	$23,857,118
Comments:						

Table 6 - Application "Table 15" Total Water Supply Benefits, JBWD Recharge Ponds

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project Title: Joshua Basin Water District Recharge Basin and Pipeline Project (CR)			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$864,298	$23,857,118	$0	$23,857,118
Comments:			

HI-DESERT WATER DISTRICT WASTEWATER TREATMENT AND WATER RECLAMATION PROJECT

Detailed estimates of operations and maintenance costs are displayed in Table 7 and its accomaning tables. The project capital and operation cost are presented in the application "Table 11" format in Table 8.

The Hi-Desert Water District is proposing to construct a wastewater treatment plant and eliminate septic system discharges. The Colorado River RWQCB is scheduled to impose a septic prohibition in March 2016 to protect the drinking water supply. Phase 1a of the project will sewer the eastern portion of the Town of Yucca Valley and convey and treat an average of 0.125 mgd. Phase 1a is a portion of the ultimate project that will collect up to 4 mgd of sewage. Not implementing the Hi-Desert wastewater treatment plant project would result in RWQCB enforcement. Such enforcement for the similar Los Osos area includes prohibitions on new connections and requirements for bi-weekly pumping of septic systems. Such provisions would have severe near-term and long-term impacts on the local economy.

Table 7 - O&M Cost Summary, HDWD Wastewater Treatment Plant

HI-DESERT WATER DISTRICT
WASTEWATER COLLECTION AND TREATMENT
OPERATIONS AND MAINTENANCE COSTS

Item	Phase 1a	Phase 1*	Phase 2*
Water Reclamation Facility	$ 967,000	$ 1,473,000	$ 1,911,000
Collection System	$ 461,000	$ 569,000	$ 691,000
Total (2008$)	**$ 1,428,000**	**$ 2,042,000**	**$ 2,602,000**
Total (2009$)	**$ 1,471,000**	**$ 2,103,000**	**$ 2,680,000**
Total (2010$)	**$ 1,510,000**	**$ 2,170,000**	**$ 2,760,000**

*cumulative costs

Unit Costs

HI-DESERT WATER DISTRICT
OPERATIONS AND MAINTENANCE COSTS
Unit Costs

Labor			
	Raw Salary	30.00	$/hr
	Overhead Multiplier	2.00	
	Burdened Cost	60	$/hr
	Hours per Year	2,080	hr/yr
	Burdened Cost per Year	124,800	$/yr/person
Power			
	Unit of Power	1	hp
	Conversion to kW-h/yr	6,537	kWh/yr/hp
	Annual Power Use	6,537	kWh/hp
	Unit Power Cost	0.15	$/kWh
	Annual Power Cost	981	$/yr/hp
	Unit of Power	1	kW
	Hours per Year	8,766	hr/yr
	Annual Power Use	8,766	kWh/yr
	Unit Power Cost	0.15	$/kWh
	Annual Power Cost	1,315	$/yr/kW

O&M Cost Detail

HI-DESERT WATER DISTRICT
WATER RECLAMATION COSTS
OPERATIONS AND MAINTENANCE COSTS

	Motor Rating	Number Running	Load Fraction	Run Time Fraction	Average Load	Units	Unit Cost/year	Fraction for 0.125 mgd	Annual Cost Phase 1a	Annual Cost Phase 2
Labor										
Operations & Maintenance Staff										
Superintendent					50%	FTE	130,000	100%	$ 65,000	$ 65,000
Operators/Maintenance					2	FTE	130,000	100%	$ 260,000	$ 260,000
SCADA/Electrical					1	FTE	130,000	100%	$ 130,000	$ 130,000
Annual Labor Costs									$ 455,000	$ 455,000
Power										
Headworks										
Bar Screens	3	1	90%	50%	1.35	hp	981	100%	$ 1,000	$ 1,000
Washer Compactor	12	1	90%	100%	10.80	hp	981	100%	$ 11,000	$ 11,000
Grit Chamber Mechanism	2	1	90%	100%	1.80	hp	981	100%	$ 2,000	$ 2,000
Grit Pumping	5	1	90%	100%	4.50	hp	981	100%	$ 4,000	$ 4,000
Grit Classifier	1	1	90%	100%	0.90	hp	981	100%	$ 1,000	$ 1,000
Grit Sump Pumps	2	1	90%	50%	0.90	hp	981	100%	$ 1,000	$ 1,000
Biofilter Fans	15	1	90%	100%	13.50	hp	981	100%	$ 13,000	$ 13,000
Biological Treatment										
Aerators	--	--	--	--	160	hp	981	6%	$ 10,000	$ 157,000
Mixers	4	4	90%	100%	14.40	hp	981	6%	$ 1,000	$ 14,000
Clarifiers	1	2	90%	100%	1.80	hp	981	6%	$ -	$ 2,000
RAS/WAS Pump Station										
RAS Pumps	15	2	90%	100%	27.00	hp	981	6%	$ 2,000	$ 26,000
WAS Pumps	15	1	90%	33%	4.46	hp	981	6%	$ -	$ 4,000
Filters										
Flash Mix Pump	3	1	90%	100%	2.70	hp	981	100%	$ 3,000	$ 3,000
Air Compressors	40	1	90%	50%	18.00	hp	981	25%	$ 4,000	$ 18,000
UV Disinfection					41	kW	1,315	25%	$ 13,000	$ 54,000
Sludge Dewatering										
Belt Filter Presses	3	1	90%	33%	0.89	hp	981	6%	$ -	$ 1,000
Belt Wash Booster Pumps	5	1	90%	33%	1.49	hp	981	6%	$ -	$ 1,000
Utility Water Pumps	15	1	90%	100%	13.50	hp	981	100%	$ 13,000	$ 13,000
Plant Drain Pump Station	10	1	90%	50%	4.50	hp	981	25%	$ 1,000	$ 4,000
Miscellaneous					40	kW	1,315	100%	$ 53,000	$ 53,000
Annual Power Costs									$ 133,000	$ 383,000
Chemical Usage										
Filtration Polymer					10,000	lb	5	6%	$ 3,000	$ 50,000
Dewatering Polymer					10,000	lb	5	6%	$ 3,000	$ 50,000
Annual Chemical Costs									$ 6,000	$ 100,000
Sludge Disposal Costs					4,800	wet ton	75	6%	$ 23,000	$ 360,000
Annual Sludge Disposal Costs									$ 23,000	$ 360,000
Maintenance and Replacements					Equip Value		Annual Mnt			
Headworks					600,000		10%	100%	$ 60,000	$ 60,000
Odor Control					25,000		10%	100%	$ 3,000	$ 3,000
Biological Reactor					700,000		10%	6%	$ 4,000	$ 70,000
Clarifiers					350,000		10%	100%	$ 35,000	$ 35,000
RAS/WAS Pump Station					175,000		10%	25%	$ 4,000	$ 18,000
Filters					550,000		10%	25%	$ 14,000	$ 55,000
UV Disinfection					950,000		20%	25%	$ 48,000	$ 190,000
Solids Handling (Belt Filter Presses)					950,000		10%	100%	$ 95,000	$ 95,000
Utility Water Pump Station					75,000		10%	100%	$ 8,000	$ 8,000
Plant Drain Pump Station					25,000		10%	100%	$ 3,000	$ 3,000
Operation Building/Shop					90,000		1%	100%	$ 1,000	$ 1,000
Power Supply and SCADA					1,500,000		5%	100%	$ 75,000	$ 75,000
Maintenance Costs									$ 350,000	$ 613,000
								Annual Operating Cost	$ 967,000	$ 1,911,000

HI-DESERT WATER DISTRICT
COLLECTION SYSTEM
OPERATIONS AND MAINTENANCE COSTS

	Motor Rating	Number Running	Load Fraction	Run Time Fraction	Average Load	Units	Unit Cost/year	Fraction for 0.125 mgd	Annual Cost Phase 1a	Annual Cost Phase 2
Labor										
Operations & Maintenance Staff										
Superintendent					50%	FTE	130,000	100%	$ 65,000	$ 65,000
Collection System Maintenance					2	FTE	130,000	100%	$ 260,000	$ 260,000
Annual Labor Costs										$ 325,000
Power										
Paxton Pump Station					250	hp	981	6%	$ 15,000	$ 245,000
Odor Control					15	hp	981	100%	$ 15,000	$ 15,000
Miscellaneous					5	kW	1,315	100%	$ 7,000	$ 7,000
Annual Power Costs									$ 37,000	$ 267,000
Maintenance and Replacements					Equip Value		Annual Mnt			
Vactor Truck Maintenance								100%	$ 50,000	$ 50,000
Paxton Pump Station (see WRF)					275,000		10%	100%	$ 28,000	$ 28,000
Kickapoo Pump Station					150,000		10%	100%	$ 15,000	$ 15,000
Odor Control					25,000		10%	100%	$ 3,000	$ 3,000
Electrical Building, Lighting, Controls, Power Tools					25,000		10%	100%	$ 3,000	$ 3,000
Maintenance Costs									$ 99,000	$ 99,000
							Annual Operating Cost		$ 461,000	$ 691,000

Table 8 - Application "Table 11", Annual Cost of Project, HDWD Water Treatment

Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project Title: Hi-Desert Water District Wastewater Treatment and Water Reclamation Project (CR)									
	Initial Costs	Operations and Maintenance Costs [1]						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009	$60,708						$60,708	1.000	$60,708
2010	$120,346						$120,346	0.943	$113,534
2011	$216,456						$216,456	0.890	$192,645
2012	$3,167,808						$3,167,808	0.840	$2,659,753
2013	$9,317,682		$166,002	$79,138			$9,562,822	0.792	$7,574,651
2014			$996,010	$474,830			$1,470,840	0.747	$1,099,097
2015			$996,010	$474,830			$1,470,840	0.705	$1,036,884
2016			$996,010	$474,830			$1,470,840	0.665	$978,193
2017			$996,010	$474,830			$1,470,840	0.627	$922,823
2018			$996,010	$474,830			$1,470,840	0.592	$870,588
2019			$996,010	$474,830			$1,470,840	0.558	$821,309
2020			$996,010	$474,830			$1,470,840	0.527	$774,820
2021			$996,010	$474,830			$1,470,840	0.497	$730,962
2022			$996,010	$474,830			$1,470,840	0.469	$689,587
2023			$996,010	$474,830			$1,470,840	0.442	$650,554
2024			$996,010	$474,830			$1,470,840	0.417	$613,730
2025			$996,010	$474,830			$1,470,840	0.394	$578,991
2026			$996,010	$474,830			$1,470,840	0.371	$546,218
2027			$996,010	$474,830			$1,470,840	0.350	$515,300
2028			$996,010	$474,830			$1,470,840	0.331	$486,132
2029			$996,010	$474,830			$1,470,840	0.312	$458,615
2030			$996,010	$474,830			$1,470,840	0.294	$432,656
2031			$996,010	$474,830			$1,470,840	0.278	$408,166
2032			$996,010	$474,830			$1,470,840	0.262	$385,062
2033			$996,010	$474,830			$1,470,840	0.247	$363,266
2034			$996,010	$474,830			$1,470,840	0.233	$342,704
2035			$996,010	$474,830			$1,470,840	0.220	$323,305
2036			$996,010	$474,830			$1,470,840	0.207	$305,005
2037			$996,010	$474,830			$1,470,840	0.196	$287,741
2038			$996,010	$474,830			$1,470,840	0.185	$271,453
2039			$996,010	$474,830			$1,470,840	0.174	$256,088
2040			$996,010	$474,830			$1,470,840	0.164	$241,593
2041			$996,010	$474,830			$1,470,840	0.155	$227,918
2042			$996,010	$474,830			$1,470,840	0.146	$215,017
2043			$996,010	$474,830			$1,470,840	0.138	$202,846
2044			$996,010	$474,830			$1,470,840	0.130	$191,364
2045			$996,010	$474,830			$1,470,840	0.123	$180,532
2046			$996,010	$474,830			$1,470,840	0.116	$170,313
2047			$996,010	$474,830			$1,470,840	0.109	$160,673
2048			$996,010	$474,830			$1,470,840	0.103	$151,578
2049			$996,010	$474,830			$1,470,840	0.097	$142,998
2050			$996,010	$474,830			$1,470,840	0.092	$134,904
2051			$996,010	$474,830			$1,470,840	0.087	$127,268
2052			$996,010	$474,830			$1,470,840	0.082	$120,064
2053			$996,010	$474,830			$1,470,840	0.077	$113,268
2054			$996,010	$474,830			$1,470,840	0.073	$106,857
2055			$996,010	$474,830			$1,470,840	0.069	$100,808
2056			$996,010	$474,830			$1,470,840	0.065	$95,102
2057			$996,010	$474,830			$1,470,840	0.061	$89,719
2058			$996,010	$474,830			$1,470,840	0.058	$84,640
2059			$996,010	$474,830			$1,470,840	0.054	$79,849
2060			$996,010	$474,830			$1,470,840	0.051	$75,330
2061			$996,010	$474,830			$1,470,840	0.048	$71,066
2062			$996,010	$474,830			$1,470,840	0.046	$67,043
2063			$996,010	$474,830			$1,470,840	0.043	$63,248
...								...	
Project Life	$12,883,000							...	
							Total Present Value of Discounted Costs (Sum of Column (i))		$28,964,537
							Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries		
Comments:									

Benefits of the proejct include:

- Removal of nitrates, suspended solids, and other contaminatnts from the waste stream and preventing their entry to the drinking water aquifer. This benefit is not monitized but is expectec to be significant.
- Recharge of the aquifer system with 140 acre-feet per year of reclaimed tertiary-treated water, avoiding the need for additonal water supply imports from the Bay-Delta through the State Water Project. This benefit maintains the current water volume recharging the aquifer sytem through septic tank. There in no additonal water recharged and this benefit is not monitized.

All monitized benefits of the Hi-Desert Water District Wastewater Treatment and Water Reclamation Project are included in Attahment 8, Water Quality and Other Benefits.

Table 9 - Application "Table 15" Total Water Supply Benefits, HDWD Water Treatment Plant

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project Title: Hi-Desert Water District Wastewater Treatment and Water Reclamation Project (CR)			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$0	$0	$0	$0
Comments: All water supply benefits are non-monitized			

MOJAVE WATER AGENCY TURF REMOVAL CONSERVATION INCENTIVE PROGRAM

Supplemental water supplies are imported from the State Water Project, used to recharge the region's groundwater aquifers, and subsequently re-pumped by local water purveyors to serve municipal and commercial demands. There are three avoided costs benefits associated with the water conservation program:

- Water purveyors who pump groundwater beyond a threshold limit established as part of the Mojave River Area Judgment are required to pay for replacement water imported from the State Water Project. The current fee the State Water Project charges for this replacement water is approximately $358 per acre-foot[6]. Thus, for every acre-foot of water conserved, water purveyors will benefit by avoiding the $358 payment.

- Water users pump groundwater to serve their customers. Assuming an average pump lift of 200 feet, a pump efficiency of 70%, and energy costs of $0.15 per kWh, every acre-foot of water conserved will avoid an energy payment of approximately $44.00.

- Mojave Water Agency's access to State Water Supply is limited by contract and by the reliability of deliveries of SWP water. Recognizing an imminent shortfall of available supply, in 2009 MWA purchased a 14,000 acre-foot of SWP Table A water contract for $5,250 per acre-foot. A more recent purchase put the cost at $5,850/acre foot. As recently as 2005, the average reliability of Mojave's SWP supplies was estimated to be 77 percent. Recent court rulings to protect endangered fish species in the Sacramento-San Joaquin Delta have restricted SWP imports, and current long-term reliability of supply is estimated to be as low as 60 percent. Assuming a long-term SWP reliability of 60 percent, the effective cost of the Table A contract is ($5,850 / 0.6 =) $9,750 per acre-foot. Amortizing this cost at 6 percent interest over 30 years yields an annualized supplemental supply purchase cost of $708 per acre-foot per year[7]. Such a purchase would also compel payment of SWP fixed annual charges, currently $169 per acre-foot. Thus, for every acre-foot of water conserved, water purveyors will benefit by avoiding the (708+169=) $877 payment for purchase of new Table A amounts[8].

Other benefits that will come from the MWA Turf Removal Conservation Incentive Program include:

- Reduced water consumption will lessen the reliance on imports from the Bay-Delta system. This benefit is considered significant, but has not been monetized for this application.

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[6] All amounts charged by DWR are estimated up-front payments, with finalized or trued-up amounts coming years later

[7] Annual water purchase costs would be in addition to this purchase of Table A supply, so this cost is not duplicative of replacement water purchases from the State Water Project discussed above

[8] The capital cost of new supply might also have been considered a one-time up-front cost, since supplemental water supplies typically need to be purchased many years in advance

- A long-term performance monitoring and reporting program is being proposed as part of this application. This program will track long-term customer behavior to determine how long-lasting the conservation savings are, and reporting this data every five years in the local and regional Urban Water Management Plans. It is believed that the vast majority of turf conversions will not revert to turf plantings after the 30-year project life, but there currently are no long-term studies to support this. This benefit is considered significant, but has not been monetized for this application.

As illustrated in Table 10, these benefits total approximately $1,295,000 per year, or $38,850,000 over the expected 30 year effective life of the turf replacement incentive program. Dividing the discounted value computed in Table 12 benefit by the program's discounted cost computed in Table 11, yields a 4.7 benefit:cost ratio.

Table 10- Summary of Project Benefits, MWA Turf Removal

Item	Amount	Units	Unit Cost	Total Cost
Benefit				
Replacement Water\1	1,012	AF/yr	$ 358.00	$ 362,000 /yr
Groundwater Pumping Energy\2	1,012	AF/yr	$ 44.00	$ 45,000 /yr
Supplemental Supply Capital\3	1,012	AF/yr	$ 877.00	$ 888,000 /yr
Total				$ 1,295,000 /yr

\1 Obligation for pumpers to purchase water under Mojave Basin Area Judgement

\2 200-foot average pump lift @ $0.15/kWh, e=0.7

\3 2009 purchase of SWP Table A at 6%, 30 years, 60% reliability

Table 11 - Application "Table 11", Annual Cost of Project, MWA Turf Removal

Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project Title: Mojave Water Agency Turf Removal Conservation Incentive Program (L)									
	Initial Costs	Operations and Maintenance Costs [1]						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009	--	--	--	--	--	--	$0	1.000	$0
2010	--	--	--	--	--	--	$0	0.943	$0
2011	$827,500	--	--	--	--	--	$827,500	0.890	$736,472
2012	$1,595,000	--	--	--	--	--	$1,595,000	0.840	$1,339,193
2013	$800,500	--	--	--	--	--	$800,500	0.792	$634,071
2014	$3,000	--	--	--	--	--	$3,000	0.747	$2,242
2015	$3,000	--	--	--	--	--	$3,000	0.705	$2,115
2016	$3,000	--	--	--	--	--	$3,000	0.665	$1,995
2017	$3,000	--	--	--	--	--	$3,000	0.627	$1,882
Total	$3,235,000	$0	$0	$0	$0	$0	$3,235,000	…	
								Total Present Value of Discounted Costs (Sum of Column (i))	$2,717,970
								Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries	

Comments: Column (a) and the associated column (d) in Table 7 for this project include $235,000 in administration and advertising costs, integral to the program, that might be considered O&M costs. Categoregorizing them as requested in the grant instructions, as shown above, does not alter the economic analysis.

(CR) Colorado River Funding Area
(L) Lahontan Funding Area

Table 12 - Application "Table 13" Annual Costs of Avoided Projects, MWA Turf Removal

Table 13 - Annual Costs of Avoided Projects **(All avoided costs should be in 2009 dollars)** **Mojave Water Agency Turf Removal Conservation Incentive Program (L)**						
	Costs				**Discounting Calculations**	
(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**
YEAR	Alternative: Purchase of Imported Supply, Recharge and Pump Groundwater *Avoided Project Description: Purchased of additional SWP entitlements, SWP annual water purchase and conveyance, groundwater recharge, and groundwater*				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2011\1	$55,500		$25,438	$80,938	0.890	$72,034
2012	$444,000		$203,500	$647,500	0.840	$543,653
2013	$832,500		$381,563	$1,214,063	0.792	$961,651
2014	$888,000		$407,000	$1,295,000	0.747	$967,699
2015	$888,000		$407,000	$1,295,000	0.705	$912,924
2016	$888,000		$407,000	$1,295,000	0.665	$861,249
2017	$888,000		$407,000	$1,295,000	0.627	$812,499
2018	$888,000		$407,000	$1,295,000	0.592	$766,509
2019	$888,000		$407,000	$1,295,000	0.558	$723,121
2020	$888,000		$407,000	$1,295,000	0.527	$682,190
2021	$888,000		$407,000	$1,295,000	0.497	$643,575
2022	$888,000		$407,000	$1,295,000	0.469	$607,147
2023	$888,000		$407,000	$1,295,000	0.442	$572,780
2024	$888,000		$407,000	$1,295,000	0.417	$540,358
2025	$888,000		$407,000	$1,295,000	0.394	$509,772
2026	$888,000		$407,000	$1,295,000	0.371	$480,917
2027	$888,000		$407,000	$1,295,000	0.350	$453,695
2028	$888,000		$407,000	$1,295,000	0.331	$428,014
2029	$888,000		$407,000	$1,295,000	0.312	$403,787
2030	$888,000		$407,000	$1,295,000	0.294	$380,931
2031	$832,500		$381,563	$1,214,063	0.278	$336,909
2032	$444,000		$203,500	$647,500	0.262	$169,514
2034\2	$55,500		$25,438	$80,938	0.247	$19,990
Project Life						
					Total Present Value of Discounted Costs (Sum of Column (g))	$12,850,918
					(%) Avoided Cost Claimed by Project	100%
					Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	$12,850,918

Comments:

(CR) Colorado River Funding Area

(L) Lahontan Funding Area

\1 Replacement projects assumed implemented uniformly over Fiscal Years 2012 and 2013, beginning in July 2011.

\2 Average 20 year life assumed, though turf removal benefits are likely to be longer.

Table 13 - Application "Table 15" Total Water Supply Benefits, MWA Turf Removal

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Mojave Water Agency Turf Removal Conservation Incentive Program (L)			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$0	$12,850,918	$0	$12,850,918
Comments:			